

CLAIMS

1. An Fe-Cr-Si based non-oriented electrical steel sheet comprising:

2.5% to 10% by mass of Si;

1.5% to 20% by mass of Cr;

0.006% by mass or less of C;

0.002% by mass or less of N;

0.005% by mass or less of S;

0.005% by mass or less of Ti;

0.005% by mass or less of Nb; and

the balance being Fe and incidental impurities,

wherein the electrical resistivity of the steel is 60  $\mu\Omega\text{cm}$  or more, and the number of nitrides containing chromium per  $\text{mm}^2$  in the interior of the steel sheet is 2,500 or less.

2. An Fe-Cr-Si based non-oriented electrical steel sheet comprising:

2.5% to 10% by mass of Si;

1.5% to 20% by mass of Cr;

0.006% by mass or less of C;

0.002% by mass or less of N;

0.005% by mass or less of S;

0.005% by mass or less of Ti;

0.005% by mass or less of Nb;

at least one of more than 0.04% to 1% by mass of Sb and more than 0.06% to 1% by mass of Sn; and

the balance being Fe and incidental impurities,

wherein the electrical resistivity of the steel is 60  $\mu\Omega\text{cm}$  or more, and the number of nitrides containing chromium per  $\text{mm}^2$  in the interior of the steel sheet is 2,500 or less.

3. An Fe-Cr-Si based non-oriented electrical steel sheet comprising:

2.5% to 10% by mass of Si;

1.5% to 20% by mass of Cr;

0.1% to 2% by mass of Al;

0.006% by mass or less of C;

0.004% by mass or less of N;

0.005% by mass or less of S;

0.005% by mass or less of Ti;

0.005% by mass or less of Nb; and

the balance being Fe and incidental impurities,

wherein the electrical resistivity of the steel is 60  $\mu\Omega\text{cm}$  or more, and the number of nitrides containing chromium per  $\text{mm}^2$  in the interior of the steel sheet is 2,500 or less.

4. An Fe-Cr-Si based non-oriented electrical steel sheet comprising:

2.5% to 10% by mass of Si;

1.5% to 20% by mass of Cr;

0.1% to 2% by mass of Al;

0.006% by mass or less of C;

0.004% by mass or less of N;

0.005% by mass or less of S;

0.005% by mass or less of Ti;

0.005% by mass or less of Nb;

at least one of 0.005% to 1% by mass of Sb and 0.005% to 1% by mass of Sn; and

the balance being Fe and incidental impurities,

wherein the electrical resistivity of the steel is 60  $\mu\Omega\text{cm}$  or more, and the number of nitrides containing chromium per  $\text{mm}^2$  in the interior of the steel sheet is 2,500 or less.

5. The Fe-Cr-Si based non-oriented electrical steel sheet according to any one of Claims 1 to 4, further comprising at least one of 1% by mass or less of Mn and 1% by mass or less of P.

6. A method for producing an Fe-Cr-Si based non-oriented electrical steel sheet comprising the steps of:

casting molten steel containing 2.5% to 10% by mass of Si and 1.5% to 20% by mass of Cr;

subjecting the cast steel to rolling process including cold rolling (including warm rolling, hereinafter the same);

and

subjecting the resulting rolled steel sheet to final annealing,

wherein the nitriding gas content in the final annealing atmosphere is controlled to less than 30 percent by volume in total in terms of nitrogen gas.

7. A method for producing an Fe-Cr-Si based non-oriented electrical steel sheet comprising the steps of:

casting molten steel containing 2.5% to 10% by mass of Si, 1.5% to 20% by mass of Cr, and at least one of more than 0.04% to 1% by mass of Sb and more than 0.06% to 1% by mass of Sn;

subjecting the cast steel to rolling process including cold rolling; and

subjecting the resulting rolled steel sheet to final annealing,

wherein the nitriding gas content in the final annealing atmosphere is controlled to less than 95 percent by volume in total in terms of nitrogen gas.

8. A method for producing an Fe-Cr-Si based non-oriented electrical steel sheet comprising the steps of:

casting molten steel containing 2.5% to 10% by mass of Si, 1.5% to 20% by mass of Cr, and 0.1% to 2% by mass of Al;

subjecting the cast steel to rolling process including cold rolling; and

subjecting the resulting rolled steel sheet to final annealing,

wherein the nitriding gas content in the final annealing atmosphere is controlled to less than 95 percent by volume in total in terms of nitrogen gas.

9. A method for producing an Fe-Cr-Si based non-oriented electrical steel sheet comprising the steps of:

casting molten steel containing 2.5% to 10% by mass of Si, 1.5% to 20% by mass of Cr, 0.1% to 2% by mass of Al, and at least one of 0.005% to 1% by mass of Sb and 0.005% to 1% by mass of Sn;

subjecting the cast steel to rolling process including cold rolling; and

subjecting the resulting rolled steel sheet to final annealing,

wherein the nitriding gas content in the final annealing atmosphere is controlled to less than 95 percent by volume in total in terms of nitrogen gas.

10. The method for producing the Fe-Cr-Si based non-oriented electrical steel sheet according to any one of Claims 6 to 9, wherein the rolling process comprises the

substeps of:

hot-rolling the cast steel slab;

subjecting the resulting hot-rolled sheet to hot-rolled sheet annealing as necessary; and

subjecting the hot-rolled sheet or annealed hot-rolled sheet to cold rolling once, or twice or more with intermediate annealing being interposed therebetween.